

SSVEO IFA List

Date:02/27/2003

STS - 51J, OV - 104, Atlantis (1)

Time:04:25:PM

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>	
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-01	MPS
	GMT:		SPR	UA	Manager: P. COTA
			IPR	PR	x3851
					Engineer:

Title: The Right Liquid Hydrogen Prevalve Close Remote Power Controller A Output Was Intermittent. ()

Summary: DISCUSSION: During preflight ground checkout, the right LH2 (liquid hydrogen) prevalve close RPC (remote power controller) A power output indication was intermittent. Troubleshooting procedures were implemented to verify that the prevalve open functions were good. During this activity, the right LH2 prevalve open power on indication was intermittent when open command C was removed. Analysis of the circuitry indicated that even if the above two failures become hard failures during ascent, it would require an additional failure to cause inadvertent closure of the prevalve. Therefore, the vehicle was launched with potential intermittent conditions and there was no mission impact.

The intermittent conditions could not be repeated during postflight troubleshooting. All suspect vehicle hardware was either inspected, tested, or removed and replaced to eliminate a potential repeat of the problem. This activity included the following: 1. The wiring from the flight deck switch panel to the aft fuselage was subjected to continuity test and a 500-volt megger test and passed. 2. The wiring in aft avionics bay 6 was visually inspected for damage in addition to a continuity and megger test and passed. 3. The aft fuselage control circuit wire segments from the aft LCA (load control assmebly) 3 to aft PCA (power control assembly) 6, the aft PCA 6 to the aft avionics bay 6 interface, and from the aft avionics bay 6 to the 1307 bulkhead have been removed, replaced, and are being subjected to visual damage inspection and bench test. 4. The control circuit wiring in the midbody and crew module have been changed out (by-passed). 5. The switch panel R4 has been removed and inspected and passed. 6. The MDM (multiplexer/de-multiplexer) FA4, PCA 6, and LCA 3 have been removed, replaced, and all are being subjected to additional bench testing and evaluation. System checkout following the above actions was nominal. CONCLUSION: The cause for the prelaunch intermittent conditions has not been determined. CORRECTIVE_ACTION: All of the suspect hardware has been either inspected, tested or removed and replaced. The prevalve control circuitry has been reverified. All removed hardware will be subjected to further failure analysis. The results of this activity will be tracked via CAR's ADO 440-000, ADO 440-100, ADO 440-200 and ADO 421. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-02
	GMT:		SPR	UA
			IPR	PR
				Manager: Thomas Graves
				x3918
				Engineer:

Title: Port Manipulator Positioning Mechanism Shoulder "A" Pyrotechnic Initiator Failed Self Test. ()

Summary: DISCUSSION: Prior to launch, the RMS (remote manipulator system) port MPM (manipulator positioning mechanism) shoulder "A" pyrotechnic initiator failed the resistance test. The "B" system was good.

Postflight troubleshooting determined that a wire near the pyrotechnic connector had been crushed between the MPM and the stop. A loop in the wire to provide slack for MPM rotation was determined to be too large. CONCLUSION: A crushed wire near the pyrotechnic connector caused the port MPM shoulder "A" pyrotechnic connector to fail the prelaunch self test. A large slack loop in the wire allowed the wire to be crushed between the MPM and the stop. CORRECTIVE_ACTION: The damaged wire was repaired with the slack loop properly sized to prevent interference. Retest was satisfactory. All of the slack loops on the MPM's for OV-104 and the other three vehicles were inspected and no other loop was found to be over sized. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-03
	GMT:		SPR	UA
			IPR	PR
				Manager: D. Prevett W.
				Scott F. Plaque
				x5495
				Engineer:

Title: Instrumentation Failures. ()

Summary: DISCUSSION: A. Fuel Cell 1 Hydrogen Flow (V45R0170A) Read Low. During the prelaunch fuel cell purge prior to fuel cell activation, the flow read low for approximately 10 minutes. At fuel cell activation, the measurement read normal and continued to read normal throughout the flight. Fly-as-is for STS 61-B.

B. SSME (Space Shuttle Main Engine) 2 Liquid Hydrogen 2 inlet temperature (V41T1201C) Failed Off-scale High At T+235 Seconds. KSC troubleshooting has determined the transducer failed. It has been replaced and failure analysis will be tracked on CAR 28F007. This measurement is not required by the LCC (launch commit criteria). CAR ANALYSIS: Sensor has been replaced and returned to the vendor for failure analysis. Cause of sensor failure has not been reported. Only one failure of this type sensor has been reported and that failure was the result of human error. C. APU 1 Gas Generator Valve Module Temperature (V46T0171A) Failed. During ascent the

measurement read off-scale low and later was intermittent. The measurement was intermittent and had been waived prior to the flight because a back-up measurement is available. Troubleshooting has isolated the failure to a bad wire splice which has been repaired. D. FES Freon Coolant Loop Temperature 1 (V63T1207A) dropped below 32 deg F during ascent and then recovered and functioned normally. Troubleshooting at KSC could not identify any problem. The temperature dip was most probably caused by a small quantity of moisture trapped in the insulation near the sensor. This moisture froze during ascent and later sublimated during orbit operations. FES Freon Coolant Loop Temperature 2 (V63T1407A) lagged temperature 1. A similar temperature lag had been experienced on OV-099. A loose sensor was suspected during the flight and was confirmed by postflight inspection. The sensor has been replaced and failure analysis will be tracked on DR 28F012. E. Fuel Cell 3 Oxygen Flow (V45R0360A) Failed Off-scale Low On Flight Day 4. Fuel cell performance can be determined from other fuel cell measurements. The measurement is not required for flight. It will be repaired when the fuel cell is removed and tracked on CAR AC9761. CAR ANALYSIS: Repairs deferred to after next flight (STS 61-B). Actions of this failure not included in basic CAR. Need dash numbered CAR. F. APU 1 Exhaust Gas Temperature 2 (V46T0140A) Failed Off-scale Low. The measurement sensor has been replaced and the failure analysis will be tracked on CAR AC7837. This measurement is not required by the LCC. CAR ANALYSIS: This is one of a series of temperature probe failures. Since probe/wiring failure has become a common occurrence, no failure analysis was performed following circuit repair. CONCLUSION: See above. CORRECTIVE_ACTION: See above. EFFECTS_ON_SUBSEQUENT_MISSIONS: None pending failure analysis.

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MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-04
	GMT:		SPR	UA
			IPR	PR
				Manager: J. Wiltz
				x5437
				Engineer:

Title: Water Spray Boiler 2 Gaseous Nitrogen Regulator Outlet Pressure Drop. ()

Summary: DISCUSSION: After powered flight, at 276:15:24:02 G.m.t., water spray boiler 2 gaseous nitrogen regulator pressure (V58P0204A) started to drop from a nominal range of 26 to 28 psia. At 276:20:06 G.m.t., the pressure reached 21 psia and continued to slowly decrease, but did not impact the mission. This has been observed on previous missions and was attributed to the gaseous nitrogen relief valve not properly seating after ascent. The nitrogen pressure tank is isolated by a valve when the water spray boiler is not functioning. This assures retention of the nitrogen source pressure should manifold leaks of this type occur.

CONCLUSION: The water spray boiler 2 gaseous nitrogen regulator pressure most probably decayed because of the relief valve not properly seating after ascent.

CORRECTIVE_ACTION: The water spray boiler 2 relief valve will be functionally verified during ground operations. The relief/regulator valve has been replaced to support STS 61-B. CAR ANALYSIS: Vendor examination of the removed valve revealed a foreign matter particle at the poppet sealing surface. The particle was foreign to the system and it can only be concluded that the particle was introduced during assembly. The only corrective action planned is to re-build and re-ATP the valve.

EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

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MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-05
	GMT:		SPR	UA
			IPR	PR
				GFE
				Manager: J. Melugin
				x2848
				Engineer:

Title: Tracks 7, 8 And 9 Of The Operations Recorder 2 Were Intermittent. ()

Summary: DISCUSSION: Tracks 7, 8 and 9 were intermittent on the OPS (Operations) 2 recorder on flight days 3 and 4. The other tracks functioned properly. Postflight testing at JSC found that the data on track 7 was inverted. The recorder will be held at JSC as a spare until a maintenance window is available at the vendor. A similar tape recorder track malfunction occurred on the OPS-2 recorder during flight 8 of OV-099 Challenger. Troubleshooting at the vendor found that the recorder heads were worn out. See problem STS-51F-13.

CONCLUSION: The OPS-2 track 7, 8 and 9 malfunction was probably caused by the inversion of the data on track 7. CORRECTIVE_ACTION: The OPS-2 recorder on OV-104 has been removed and replaced. Failure analysis will be tracked on FIAR HEN-0055F. FIAR ANALYSIS: The OPS recorder is GFE to the Orbiter and, as such, is not tracked within the Rockwell failure reporting system. NASA is tracking fault isolation, failure analysis, repair and corrective action on FIAR HEN-0055F.

EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-06
	GMT:		SPR	UA
			IPR	PR
				OMS
				Manager: John Hooper
				x3851
				Engineer:

Title: Right Orbital Maneuvering System Total Fuel Quantity Reading Offset. ()

Summary: DISCUSSION: At the end of the de-orbit OMS (orbital maneuvering system) burn, the right OMS total fuel quantity read about 10 percent higher than the aft fuel quantity. At that time the right total fuel quantity should have read the same as the aft fuel quantity. There was no mission impact.

Postflight checkout revealed that the output from the forward probe was at a high level which is indicative of a shorted probe. This probe had been replaced when the OMS pod was in the HMF (hypergolic maintenance facility) prior to flight. The aft fuel quantity probe continues to function normally and will allow propellant loading and flight operations with only minor penalties until a window is available for the right OMS pod removal and subsequent forward probe investigation. The KSC probe removal and installation procedures will be investigated. CONCLUSION: The right OMS total fuel quantity anomalous indication was most probably caused by a shorted forward

probe. **CORRECTIVE_ACTION:** KSC fuel quantity probe removal and installation procedures will be reviewed. The right OMS forward fuel probe will be removed, replaced and re-verified when the pod can be removed. The results of this activity will be tracked via CAR 28F010. **EFFECTS_ON_SUBSEQUENT_MISSIONS:** The right OMS total fuel quantity will continue to read high.

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MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-07	TPS
	GMT:		SPR	UA	Manager: C. Schomburg
			IPR	PR	J. Smith
					x5539
					Engineer:

Title: TPS Damage On Left Inboard Elevon Leading Edge And In Nose Cap Area. ()

Summary: DISCUSSION: Postflight inspection of the TPS at DRFC showed two areas of significant damage as follows:

A. Severe slumping of tiles 399415-099 and -097, which are located on the lower surface adjacent to the RCC (reinforced carbon carbon) nose cap occurred during entry. This damage was in the same general location and was approximately the same magnitude of tile damage, as that sustained by OV-102 during STS-5. Detailed inspection at KSC showed severe slumping and melting down the tile sidewalls. Direct flow impingement with partial melting/charring of the flow restrictor at the RCC/HRSI (high temperature reusable surface insulation) tile interface was evident. However, visual inspection of this interface area did not indicate any damage to the aluminum carrier panel structure or the RCC attachment hardware. The damaged tiles, gap fillers and a portion of the flow restrictor have been replaced using normal procedures. B. A plasma flow between tiles 193007-023 and -088 on the left hand inboard elevon leading edge severely damaged the adjacent aft tile (193001-249) and the underlying 2 carrier panels as well as the filler support bracket between the carrier panels. The primary seal retainer was locally warped and distorted by the high temperature. There was no damage to the elevon leading edge or the secondary seal. The carrier panels, tile, and filler support bracket have been replaced and the weakened structure has been strengthened with doublers. **CONCLUSION:** A. The cause of the nose area tile damage could have been flow through due to the circumferential gap filler not completely filling the cavity between the RCC and HRSI, looseness of fore/aft gap filler between tiles, and/or loss of seal between the flow restrictor and the RCC expansion seal. B. The elevon damage was most probably the result of an improperly installed gap filler. **CORRECTIVE_ACTION:** Normal tile and structural repair procedures have restored the damaged areas to a flight worthy condition for STS-61B. Gap filler installation and inspection procedures, improved as a result of OV-103 similar problems, are adequate. **CAR ANALYSIS:** Cause of the damage was not positively identified. However, most probable cause was out-of-tolerance step and gap conditions on TPS tile on wing lower surface forward of the elevon leading edge. **EFFECTS_ON_SUBSEQUENT_MISSIONS:** NONE

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MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-08	MPS

GMT:

SPR
IPR

UA
PR

Manager: J. Wiltz J.
Vernon
x3851
Engineer:

Title: High Main Engine Secondary Differential Pressure. ()

Summary: DISCUSSION: After main engine hydraulic repressurization, the left and center main engine pitch and yaw actuators secondary differential pressures were 300 to 500 psi. The nominal value is from 0 to 30 psi. This increased pressure condition existed until APU 1 was shut down postflight, at which time the secondary differential pressure went to 0 psi. The main propulsion system thrust vector control isolation valves were verified closed by telemetry data.

CONCLUSION: The high left and center main engine pitch and yaw actuators secondary differential pressures were probably a result of a leaking or partially closed isolation valve on APU-1. CORRECTIVE_ACTION: The main engine thrust vector control isolation valves will be functionally verified and leak tested during ground operations. CAR ANALYSIS: Analysis showed that the close command was too short in duration to obtain a latched close condition. Suspect that contamination was not a contributor. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

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MER - 0	MET: GMT:	Problem	FIAR SPR IPR	IFA STS-51J-V-09 UA PR
				Manager: B. Embrey x4191 Engineer:

Title: Payload Bay Camera B Was Difficult To Focus And Camera C Pan/Tilt Function Failed. ()

Summary: DISCUSSION: Postflight, the crew reported that PLB (Payload Bay) camera B was difficult to focus and the PLB camera C Pan/Tilt Assembly would only pan in the clockwise direction. The tilt travel on PLB camera C was slow and finally the Pan/Tilt function failed altogether. Neither condition could be duplicated postflight while the cameras were installed in the vehicle. Both cameras and the C Pan/Tilt Assembly were removed, replaced, and reverified.

Bench testing of camera B found that the MLA (Monochrome Lens Assembly) was out of far focus when the lens was zoomed out. The MLA has been returned to the vendor for failure analysis. The inflight condition observed on camera C Pan/Tilt Assembly was duplicated during bench tests. The Pan/Tilt Assembly has been returned to the vendor for failure analysis. CONCLUSION: None pending the results of failure analysis. CORRECTIVE_ACTION: Cameras B and C and the camera C Pan/Tilt Assembly have been removed, replaced and reverified. The MLA of camera B and the Pan/Tilt Assembly of camera C have been returned to the vendor for failure analysis. The results of this activity will be tracked via FIAR EE-0615F for camera B and FIAR EE-0616F for camera C Pan/Tilt Assmebly. FIAR ANALYSIS: Payload

bay cameras and their pointing electronics/mechanisms are GFE to the Orbiter and are not tracked in the Rockwell failure reporting system. NASA is tracking fault isolation, failure analysis, repair and corrective action on FIAR's EE-0615F and EE-0616F. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-09
	GMT:		SPR	UA
			IPR	PR
				Manager: B. Embrey
				x4191
				Engineer:

Title: Payload Bay Camera B Was Difficult To Focus And Camera C Pan/Tilt Function Failed. ()

Summary: DISCUSSION: Postflight, the crew reported that PLB (Payload Bay) camera B was difficult to focus and the PLB camera C Pan/Tilt Assembly would only pan in the clockwise direction. The tilt travel on PLB camera C was slow and finally the Pan/Tilt function failed altogether. Neither condition could be duplicated postflight while the cameras were installed in the vehicle. Both cameras and the C Pan/Tilt Assembly were removed, replaced, and reverified.

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<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-10
	GMT:		SPR	UA
			IPR	PR
				Manager: N. Jervas
				x3643
				Engineer:

Title: Airlock Hatch "A" Did Not Latch In Open Position. ()

Summary: DISCUSSION: Postflight the crew reported airlock hatch "A" would not latch in the full open position and had to be forced to latch in the intermediate 2/3 open position.

Inspection at KSC showed the latch hold-open mechanisms were not properly aligned. The hold-open mechanisms have been realigned and the hatch latching function of both hold-open mechanisms have been verified. CONCLUSION: The hatch hold-open mechanisms were not properly aligned and the cause of the misalignment is unknown. CORRECTIVE_ACTION: Hatch latch mechanisms have been realigned. CAR ANALYSIS: Visual examination of the physical distortion and analysis of the DFRF payload bay access methods leads to the conclusion that 1G hatch "A" support GSE was not used. SPC has been advised that damage can be expected if unauthorized procedures are used. EFFECTS_ON_SUBSEQUENT_MISSIONS: NONE

<u>Tracking No</u>	<u>Time</u>	<u>Classification</u>	<u>Documentation</u>	<u>Subsystem</u>
MER - 0	MET:	Problem	FIAR	IFA STS-51J-V-11
	GMT:		SPR	UA
			IPR	PR
				Manager: Tom Lewis
				x2126
				Engineer:

Title: Left Display Driver Unit Data Good Bite Toggled During Entry. ()

Summary: DISCUSSION: After wheel stop, the commander's left DDU (Display Driver Unit) good bite toggled 25 times. Toggling identical to this was seen on both the left and right DDU's during an end-to-end test in June, 1985. Postflight testing at KSC has not repeated the failure in the left DDU. The failure did repeat intermittently in the right DDU. When data bus 2 was selected for input to the right DDU, right-hand flight instrumentation was lost. Both DDU's have been replaced with like units from OV-103.

CONCLUSION: The cause of the DDU good bite toggling is unknown pending failure analysis. CORRECTIVE_ACTION: Both the left and right DDU's have been removed, replaced and returned to the vendor for failure analysis. The results of this activity will be tracked via CAR 28F011-000.

EFFECTS_ON_SUBSEQUENT_MISSIONS: None pending the results of failure analysis.
